

Report of the
Task Force to Evaluate the Development and Construction of a
Magnetic Levitation Transportation System

to the
Governor of Maryland
and the
Maryland General Assembly

February, 2003

As required by House Bill 1431
Adopted by the 2002 General Assembly

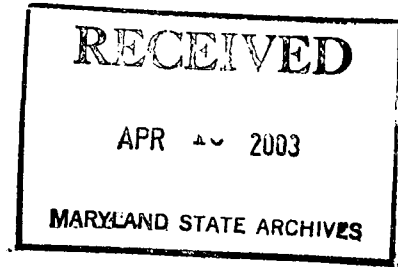
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February 27, 2003

The Honorable Robert L. Ehrlich
Governor
State House
Annapolis MD 21401

The Honorable Thomas V. Mike Miller, Jr.
President of the Senate
State House, H-107
Annapolis MD 21401-1991

The Honorable Michael E. Busch
Speaker of the House
State House, H-101
Annapolis MD 21401-1991



Dear Governor Ehrlich, President Miller and Speaker Busch:

We are pleased to provide you with the report of the Task Force to Evaluate the Development and Construction of a Magnetic Levitation Transportation System as required by House Bill 1431, enacted by the 2002 Maryland General Assembly.

The Task Force is composed of representatives appointed by the Governor, Senate President and House Speaker in 2002. The panel included members of the General Assembly, state officials, local government officials, industry experts and citizens whose communities could be impacted by the project. In accordance with the legislation, committee meetings were held during the 2002 interim to examine specific aspects of the Maglev project proposal, but not to make a recommendation as to whether the project should or should not be implemented. This report provides an overview of the information which was analyzed as well as comments and suggestions of the Task Force for your consideration.

The deployment of a magnetic levitation technology train would be a unique project in the history of United States and local infrastructure. While the project has the potential to bring many benefits to Maryland and the two metropolitan regions, it would also be the most technically and organizationally complex infrastructure project undertaken in Maryland in many decades. This report provides information on the unusual aspects of the project such as project management and ownership, financing, procurement, and public involvement. It further explains special challenges the Maglev project will present to Maryland should a decision be made to proceed.

The Honorable Robert L. Ehrlich
The Honorable Thomas V. Mike Miller, Jr.
The Honorable Michael E. Busch
February 27, 2003
Page Two

The Task Force invested many hours of time in preparing its recommendations. It is convinced that a decision to pursue the project will necessarily require a large commitment of financial resources as well as legislation at both the state and federal level. The Task Force stresses the importance of taking sufficient time to fully understand the issues and long term implications before a final decision is made.

It has been a privilege to serve as co-chairmen of this esteemed group of individuals. We truly appreciate the time, concern and thoughtfulness that have gone into our discussions and development of this report. Please let us know if we can be of further assistance to you in your review of this report or discussion of the issues.

Sincerely,



Thomas B. Deen



William S. Ratchford II

cc: Members of the Task Force

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Table of Contents

EXECUTIVE SUMMARY	1
Project Description.....	1
Benefits	2
Project Challenges	2
Closing	3
CHAPTER 1: TASK FORCE PURPOSE; WORK PROCESS	4
Introduction.....	4
Task Force Membership	4
Meeting Process	5
Purpose of the Report.....	6
CHAPTER 2: MAGLEV PROJECT DESCRIPTION	7
Introduction.....	7
Federal Deployment Program	7
Potential Project Benefits.....	8
Project Description.....	8
Project Cost and Finance Plan	9
Environmental and Community Impacts	9
Project Challenges	11
CHAPTER 3: INSTITUTIONAL CHALLENGES.....	12
Unique Project Characteristics.....	12
Institutional Issues Presented to the Task Force	12
Task Force Observations.....	13
CHAPTER 4: PROCUREMENT CHALLENGES	15
Unique Project Characteristics.....	15
Procurement Issues Presented to Task Force.....	15
Task Force Observations.....	16
CHAPTER 5: REVENUE, COSTS AND FINANCE PLAN CHALLENGES	18
Unique Project Characteristics.....	18
Finance Plan Presented to Task Force	18
Task Force Observations.....	24
CHAPTER 6: OTHER SIGNIFICANT ISSUES.....	27
Analysis of Total Economic Benefits and Costs.....	27
Security	27
Liabilities and Warranties	28
Need for Additional/Continuing Public Input.....	28

Appendices

- Appendix 1: House Bill 1431
- Appendix 2: Project Alignment Map
- Appendix 3: Potential Project Timeline
- Appendix 4: Members of Ridership Peer Review Committee
- Appendix 5: Additional Comments from Task Force Members

EXECUTIVE SUMMARY

House Bill 1431, adopted by the 2002 Maryland General Assembly, established a Task Force to evaluate the development and construction of a prototype Magnetic Levitation transportation system between Baltimore and Washington, D.C. which is under study by the Maryland Transit Administration. Over a series of meetings in late 2002 and early 2003, the Task Force completed its work and prepared its report. The Governor, the President of the Maryland Senate and Speaker of the Maryland House appointed the Task Force Membership. Representatives included local transportation officials, experts from industry and the private sector, citizens whose communities could be impacted by the project and members of the Maryland House and Senate. Several members of the cabinet served in an Ad Hoc capacity.

The Task Force was charged with providing the Governor and the General Assembly with information regarding the Maglev Project within the scope of requirements of the legislation and, as such, does not make any recommendation as to whether the project should or should not be implemented. The legislation required the Task Force to:

1. Evaluate the feasibility and benefits of and alternatives for establishing a State or multi-jurisdictional authority;
2. Examine funding mechanisms and potential State and local funds required;
3. Examine various alternative structures and public/private partnership potential for the design, construction, ownership, and operation of the Maglev system;
4. Consider how to achieve the objectives of federal law regarding implementing a public/private partnership within the context of a State or multi-jurisdictional authority;
5. Evaluate the need for modifications to the procurement system; and
6. Develop recommendations regarding the establishment of a State or multi-jurisdictional authority and the role to be played by the State and its various agencies.

This report summarizes the Task Force findings and identifies issues for further exploration and questions to be answered prior to a final decision on the project.

Project Description

Magnetic Levitation (Maglev) is an advanced surface transportation technology that utilizes linear motor propulsion and a non-contact electromagnetic support system to lift, guide and propel a vehicle forward at speeds of 250-300 miles per hour (MPH). The vehicle "floats" a fraction of an inch from a special guideway on a cushion of magnetic energy, thereby eliminating friction and noise and the loss of energy associated with it. A 40-mile corridor from Baltimore to Washington is currently under study to determine the feasibility of constructing the first Maglev project in the United States.

The Maglev Deployment Program was established in the federal Transportation Equity Act for the 21st Century. The federal project selection process has, since 1998, reduced the number of projects in the program from 11 to two, including the Baltimore-Washington project and a project in Pittsburgh, Pennsylvania. A single project will be selected by the Federal Railroad Administration in 2003 to be eligible for up to \$950 million in funding assistance. The 38.6-mile Baltimore-Washington project would cost \$3.7 billion in current dollars. Based on the current estimates of ridership and revenue, \$2 billion could be raised from the sale of revenue bonds, approximately \$1.5 billion is expected in State and federal grants. Most of the remainder will come from the U.S. Department of Transportation's Transportation Infrastructure Finance and Innovation Act (TIFIA) Program, which provides treasury rate financing for large public infrastructure projects. While three alignments were initially studied, the Maryland Transit Administration (MTA) of the Maryland Department of Transportation will only continue looking at an alignment along Amtrak's existing Northeast Corridor right of way and the "No Build" alternative.

Benefits

Federal and State interest in Maglev is based on its potential to provide a variety of benefits, including significantly reduced travel times and associated economic benefits, energy efficiency, lower maintenance costs, safety and increased frequency of service. In the Baltimore-Washington corridor, potential benefits include a less than 20-minute travel time from Baltimore to Washington. This allows the more complete integration of the region's economies where companies can more easily capture the relative benefits and cost differentials associated with both Baltimore and Washington. Based on current ridership estimates, the project could divert 30,000 auto trips from highways each day, reducing congestion and auto-related air pollution. With a stop at BWI Airport, Maglev would greatly increase the accessibility of BWI Airport from both Baltimore and Washington. Finally, the project could attract attention to the region for research in further commercial applications of the technology, and could be of substantial interest to tourists looking to see the unique aspects of the system.

Project Challenges

Maglev is a unique project in the history of U.S. and local infrastructure. It would be the most technically and organizationally complex infrastructure project undertaken in Maryland in many decades. The Task Force report identifies the unusual aspects of the project and the special challenges it will present should a decision be made to proceed. The report contains specific observations about these challenges and identifies issues that need further exploration before the project decision is made. The Task Force believes these challenges lie in three general areas:

1. Institutional. There is no existing public or private institution that has all of the necessary powers and expertise needed to carry the project forward. While a number of relevant models exist, a new and unique organization (such as a bi-state authority) must be created to manage the project. (For more details on institutional challenges, please see Chapter 3 of the report.) This may require State and federal legislation.

2. **Procurement.** Two aspects of procurements are unique to this project. First, the technology is owned by a single corporate entity. MTA studies have revealed there is no viable, ready-to-deploy alternative to Transrapid, Inc. (TRI). Therefore, a unique contracting relationship is required to manage this relationship and achieve the federal intent of a technology transfer to the United States. Secondly, project risks must be carefully managed, possibly through a "design-build-operate-maintain" procurement regime although the Task Force believes there may be other viable models. (For more details on the procurement challenges, please see Chapter 4 of the report.) State and federal legislation will be required to address these issues.
3. **Financing.** Maglev is unusual in that it will require substantial financing from the private bond market. This market must be convinced that project revenues will support necessary coverage and an investment grade rating. The financial plan also assumes a \$950 million grant from the federal government and a \$500 million grant from Maryland and the District of Columbia. The Task Force has expressed concern regarding the uncertainty of the proposed financing plan. (For more details on the financing challenges, please see Chapter 5 of the report.)
4. **Other.** The Task Force identified a number of other issues that should be addressed, including the need for a rigorous economic benefit-cost analysis, security, protection of private sector participants from excess liability and additional opportunities for public input particularly in Prince George's County. (For more details on the other challenges, please see page 24 of the report.)

Closing

While this brief overview is provided as an Executive Summary of the Task Force work, the reader is strongly encouraged to review the entire Task Force Report to fully understand the issues and the responses from the members. Many hours of time were invested in the work of the Task Force to provide the Governor and the members of the General Assembly with sufficient information to fulfill the requirements of House Bill 1431. The decision to pursue a project of this magnitude and complexity will be one of great commitment and investment requiring large amounts of funding as well as special state and federal legislation. Sufficient time should be taken to fully understand the issues and long term implications.

CHAPTER 1: TASK FORCE PURPOSE; WORK PROCESS

Introduction

House Bill 1431, adopted by the 2002 Maryland General Assembly, established a Task Force to evaluate the development and construction of a prototype Magnetic Levitation transportation system between Baltimore and Washington, D.C. which is under study by the Maryland Transit Administration of the Maryland Department of Transportation. Over a series of meetings in late 2002 and early 2003, the Task Force completed its work and prepared this report. Specifically, House Bill 1431 requires the Task Force to:

1. Evaluate the feasibility and benefits of and alternatives for establishing a State or multi-jurisdictional authority;
2. Examine funding mechanisms and potential State and local funds required;
3. Examine various alternative structures and public/private partnership potential for the design, construction, ownership, and operation of the Maglev system;
4. Consider how to achieve the objectives of federal law regarding implementing a public/private partnership within the context of a State or multi-jurisdictional authority;
5. Evaluate the need for modifications to the procurement system; and
6. Develop recommendations regarding the establishment of a State or multi-jurisdictional authority and the role to be played by the State and its various agencies.

Task Force Membership

The law also established the Task Force membership, which is as follows:

Three Senators, appointed by the President of the Senate:

The Honorable Edward J. Kasemeyer
The Honorable J. Edward DeGrange, Sr.
The Honorable Arthur Dorman

Three Delegates, appointed by the Speaker of the House of Delegates:

The Honorable Mary Anne Love
The Honorable Theodore Sophocleus
The Honorable Anne Healey

Representatives of communities impacted by the project, appointed by the Governor:

Mr. Alan D. Doelp, Anne Arundel County
Ms. Ernie A. Kent, Howard County

Mr. Roscoe R. Nix, Montgomery County
Mr. Anthony T. Rodgers, Baltimore City
Mr. Moses Rodriguez, Baltimore County
Mr. James C. Rosapepe, Prince George's County

Representatives of County Executives of selected counties and the Mayor of Baltimore City:

Mr. Carl Balser, Howard County
Mr. Craig Forrest, Baltimore County
Mr. Alfred H. Foxx, Baltimore City
Mr. Edgar Gonzalez, Montgomery County
Ms. Betty Hager Francis, Prince George's County
Mr. Ron McGuirk, Anne Arundel County

Ex-Officio members:

The Honorable T. Eloise Foster, Secretary, Department of Budget and Management
The Honorable David Iannucci, Secretary, Department of Business and Economic Development
The Honorable John D. Porcari, Secretary, Department of Transportation
Mr. David Whitaker, Department of Planning

Industry experts, appointed jointly by the President of the Senate and the Speaker of House:

Mr. John Cefalu, Engineering and Construction
Mr. Thomas B. Deen, Transportation
Mr. William S. Ratchford, II, Banking and Finance
Mr. Phillip Tarnoff, Technology Manufacturing
Mr. Otis Warren, Business Development

Mr. Deen and Mr. Ratchford were appointed co-chairmen by the President of Senate and Speaker of the House. Although not specified in the legislation, the co-chairs appointed Mr. Rick Rybeck of the District of Columbia Department of Transportation to participate as a non-voting member.

Meeting Process

Meetings of the Task Force were held in Annapolis between October 17, 2002 and January 2003. Meeting topics were as follows:

Meeting 1:	Introduction; purpose of Task Force; project description
Meeting 2:	Ownership entity; procurement options
Meeting 3:	Ridership and revenue forecast; construction cost estimate
Meeting 4:	Finance plan

Meeting 5: Liabilities and warranties; review report outline
Meeting 6: Adoption of Report

Meetings were alternately chaired by the co-chairmen. Technical presentations were made by project staff, consultants and others invited by the Task Force and were followed by questions and comments from the Task Force members.

Purpose of the Report

This report was prepared by the project staff under the direction of the Task Force. The conclusions and suggestions presented are solely those of the majority of Task Force members. The report is intended to provide the Governor and the General Assembly with information regarding the Maglev Project within the scope of requirements of House Bill 1431. As such, it does not provide any recommendation as to whether the project should or should not be implemented. This report identifies issues for further exploration and questions to be answered prior to moving forward with the project if the decision makers determine it is in the best interest of the State to do so.

Chapters 3, 4 and 5 are formatted first to recap the information on specific issues presented to the Task Force during its meetings. Each part is then followed by observations regarding that information. It is important to note that the Task Force met on a limited basis and was not able to, nor was it charged with, addressing all issues relative to the Maglev project. This report is focused only on certain target areas and decision makers are encouraged to fully address all other critical issues before reaching any final conclusions as to whether the project should proceed, by what means and under what schedule.

CHAPTER 2: MAGLEV PROJECT DESCRIPTION

Introduction

Magnetic Levitation (Maglev) is an advanced surface transportation technology that utilizes linear motor propulsion and a non-contact electromagnetic support system to lift, guide and propel a vehicle forward at speeds in excess of 300 miles per hour (MPH). The vehicle "floats" a fraction of an inch from a special guideway on a cushion of magnetic energy, thereby eliminating friction and the loss of energy associated with it. Because the power supply and motor are housed in the guideway and are only energized when needed for a passing vehicle, precise control at high speeds can be achieved.

A 40-mile corridor from Baltimore to Washington is currently under study to determine the feasibility of constructing the first Maglev project in the United States. The study has been undertaken by the Maryland Transit Administration (MTA) of the Maryland Department of Transportation with financial and technical support from the U.S. Maglev Deployment Program of the Federal Railroad Administration.

Federal Deployment Program

The Maglev Deployment Program, established in the Transportation Equity Act for the 21st Century, establishes specific criteria for a project to receive support under the program. Specifically, the project must:

- Use magnetic levitation technology. Several types of Maglev technology exist, but the type developed by Transrapid, Inc. (TRI) of Germany is the only one determined to be suitable in this corridor.
- Select a "ready to deploy" technology. TRI's TR-08 has been certified for revenue service in the U.S., and a revenue operation is under construction in Shanghai, China and expected to be in service in 2003.
- Safely reach 240 MPH.
- Include a public-private partnership. Federal funding is limited to the construction of the special guideway, and must include at least \$450 million from non-federal sources.
- Be extendable to other destinations. The federal program is most concerned about the benefits of the technology in a lengthy corridor where it could supplement existing Amtrak or passenger air service. Service north to Boston and south to Charlotte, North Carolina has been investigated.

The federal project selection process has, since 1998, reduced the number of projects in the program from 11 to two, including the Baltimore-Washington project and a project in Pittsburgh, Pennsylvania. Environmental Impact Statements for both projects are due in early

2003. Based on its review of these documents and accompanying project finance plans, a single project will be selected in spring, 2003 to be eligible for up to \$950 million in funding assistance.

Potential Project Benefits

Federal and State interest in Maglev is based on its potential to provide a variety of benefits such as significantly reduced travel times. Maglev is also potentially more energy efficient than traditional forms of surface and air transportation. For example, Maglev uses 25-35% less energy than wheel-on-rail high-speed train due to the lack of friction associated with the electric traction locomotive and wheel/rail interface of a conventional train. Maintenance, and therefore operating cost, is also reduced for the same reason.

Second, Maglev requires a grade-separated guideway that will not interfere with existing transportation networks. Because of the high-speed nature of the service and the design of the guideway, it must be placed above grade on an elevated structure or below grade in a tunnel. It may also be built at-grade when suitable right of way is available.

Third, the service is thought to be safer than conventional trains because the vehicle is wrapped around the guideway, making derailment unlikely. Further, since the propulsion system is in the guideway, only one vehicle can be in a given location which eliminates the possibility of a collision. This also allows very frequent service which is a substantial benefit for passengers.

In the Baltimore-Washington corridor, potential benefits include a less than 20-minute travel time from Baltimore to Washington. This allows the more complete integration of the region's economies where companies can more easily capture the relative benefits and cost differentials associated with both Baltimore and Washington. Travel time is dependable, with no weather-related delays or congestion associated with competing use of the facility. Based on current ridership estimates, the project could divert 30,000 auto trips from highways each day, reducing congestion and auto-related air pollution. With a stop at BWI Airport, Maglev would greatly increase the accessibility of BWI Airport from both Baltimore and Washington. Finally, the project could attract attention to the region for research in further commercial applications of the technology, and could be of substantial interest to tourists looking to see the unique aspects of the system.

Project Description

Based on MTA work to date, the project would be 38.6 miles long. The travel time from Baltimore to Washington would be 17.5 minutes. Headways (frequency) would be 10 minutes in the peak period and 15-30 minutes in the off peak. The service would operate 18 hours day and seven days a week utilizing three-car trains with the option to increase to five-car trains in the future.

Three stations would be located at Camden Yards in Baltimore directly north of Camden Station; adjacent to the terminal at BWI Airport in Anne Arundel County; and beneath Union Station in Washington, D.C. An option exists for a fourth station at the Capital Beltway in New Carrollton, Maryland.

Fares are assumed to range from \$10 to \$33 for a one-way trip, depending on distance traveled and type of ticket purchased. Substantial discounts are assumed for commuters.

Based on this fare and operating plan, daily ridership in 2010, the first year of revenue operation, is forecast to be in the range of 30,000 to 39,000 daily. Many of the passengers would be connecting directly to or from flights at BWI Airport, and others would be business travelers, commuters and tourists. The ridership forecast was prepared using a rigorously conducted "stated preference" survey and a sophisticated travel demand model originally developed for the Channel Tunnel from England to France. Ridership work was overseen by a panel of nationally recognized experts, and a number of refinements have been undertaken as a result of their comments. (See Appendix 4) The "peer review" analysis was not complete at the time the Task Force concluded its work.

Project Cost and Finance Plan

The full cost estimate for the system is \$3.7 billion in current dollars, and \$4.4 billion when inflated to the mid-point of construction in 2008 (based on 3% inflation factor). The preliminary project finance plan shows a combination of funding sources, including project-supported revenue bonds and grants from the federal government, Maryland and the District of Columbia. Based on the current estimates of ridership and revenue, \$2 billion could be raised from the sale of revenue bonds, approximately \$1.5 billion is expected in federal, Maryland and the District of Columbia grants. Most of the remainder will come from the U.S. Department of Transportation's TIFIA Program which provides treasury rate financing for large public infrastructure projects.

Environmental and Community Impacts

During preparation of the Environmental Impact Statement, three alignment alternatives were developed and studied for their impacts on a wide variety of resources. The alternatives considered were as follows:

- Alternate A: I-95 Parallel. From south of BWI Airport to the Capital Beltway, substantially following I-95.
- Alternate B: Baltimore/Washington Parkway Parallel. From south of BWI Airport to the Capital Beltway, substantially following the Baltimore/Washington Parkway.
- Alternate C: Amtrak Parallel. From BWI Airport to Union Station, substantially following Amtrak's Northeast Corridor right of way.

All alternatives are identical from BWI Airport to Baltimore, substantially following the Baltimore/Washington Parkway. Alternatives B and C are identical from the Capital Beltway to Union Station, substantially following the CSX right of way.

Documentation of possible impacts to the natural environment includes parkland; wetlands; federal lands; floodplains; water quality; secondary and cumulative effects; Rare,

Threatened and Endangered Species; wildlife and wildlife habitat; and forests and significant trees.

Documentation of possible impacts to the human environment included noise and vibration; air quality; socioeconomic impacts; community features; Environmental Justice; aesthetics and viewsheds; economic impacts; cultural resources; recreational resources; public health and safety; Electromagnetic Frequency (EMF)/ Electromagnetic Radiation (EMR).

Documentation of possible impacts to the physical environment includes land use; hazardous waste; energy usage; construction impacts; electromagnetic compatibility with other facilities in the region; local short term use of the environment and enhancement of long term productivity; topography; soils; geology; climate; farmlands; and transportation and traffic.

In addition to technical analysis, between 1999 and 2002 the MTA held 20 advertised public information meetings in Baltimore City, the District of Columbia, Anne Arundel County, and Howard County. During that same time period, over 30 additional briefings for community associations and other organizations along the proposed alignment in Baltimore City, the District of Columbia, Anne Arundel County, Howard County and Prince George's County. In 2002, over 1,000 public comments were received. The majority of public comments fell into the categories shown below:

- Local community impact
- Risk to property values
- Environmental impact (forest, wetlands, open space)
- Noise
- Lack of local benefit
- Total cost
- Likelihood of funding
- Fares too high
- Safety
- Adequacy of public notification

As a result of the public input and a systematic analysis of the data collected on project impacts, the MTA recommended retaining the Amtrak Parallel build alternative and the No Build alternative for detailed study.

As a result of public unfamiliarity with Maglev, a detailed noise analysis was conducted as part of the EIS. Field measurements were taken at TRI test track in Germany and compared to field measurements of cumulative impacts taken along the alignment in Maryland. Impacts were classified as "No Impact," "Impact," or "Severe Impact" according to thresholds established by the Federal Railroad Administration. Thresholds are a function of land use category, existing noise levels, Maglev speed and distance of the receptor from the guideway. In general, the more ambient noise already exists, the less project noise is tolerated before being classified as impact or severe impact. The MTA assumed mitigation with noise walls for "Impact" or "Severe Impact" areas. Noise walls can reduce noise level by 10 decibels, thereby eliminating all

"Impact" and "Severe Impact" locations. In total, 25% of the project length will require noise walls, which are approximately four feet high and can be mounted on the elevated guideway or be built along the ground for at-grade sections.

A number of studies are on-going as part of the completion of the EIS. These include further in-depth studies of environmental, historical and socioeconomic features identified to date; in-depth engineering studies of "sensitive areas" where impacts have the potential to be reduced; additional coordination meetings with communities and public resource agencies. FRA will be responsible for public hearings that may be held in spring 2003.

Project Challenges

Maglev is a unique project in the history of U.S. and local infrastructure. It would be the most technically and organizationally complex infrastructure project undertaken in Maryland in many decades. The Task Force is making no recommendation for or against the project in as much as such a determination requires comparing the merits and costs of this project against many others competing for State financing and attention, and evaluation of other projects was outside the scope of the Task Force. Rather, this report sets forth the unusual aspects of the project and the special challenges it will present should a decision be made to proceed.

The Task Force believes these challenges lie in three general areas:

1. Institutional. There is no existing public or private institution that has all of the necessary powers and expertise needed to carry the project forward. While a number of relevant models exist, a new and unique organization must be created to manage the project.
2. Procurement. Two aspects of procurements are unique to this project. First, the technology is owned by a single corporate entity. MTA studies have revealed there is no viable, ready-to-deploy alternative to TRI. Therefore, a unique contracting relationship is required to manage this relationship and achieve the federal intent of a technology transfer to the United States. Secondly, project risks must be carefully managed, possibly through a "design-build-operate-maintain" procurement regime although the Task Force believes there may be other viable models.
3. Financing. Maglev is unique in that it will require substantial financing from the private bond market. This market must be convinced that project revenues will support necessary coverage and an investment grade rating. The financial plan also assumes a \$950 million grant from the federal government and a \$500 million grant from Maryland and the District of Columbia.

The remainder of this report will address these unique challenges in turn.

CHAPTER 3: INSTITUTIONAL CHALLENGES

Unique Project Characteristics

If constructed in Maryland and the District of Columbia as studied, successful deployment of the project would require the creation of one or more special institutions to own, finance, construct and operate the project. The project is costly and technically complex, and there is no previous experience in the United States. Second, the project begins with a bi-state alignment, and future extensions would include additional states as well. Finally, the project finance plan relies heavily on revenue bonds, and there is a need for an organization that can maximize the security of the bondholders and thereby achieve the highest possible rating on its bonds.

Institutional Issues Presented to the Task Force

Previous MTA work presented to the Task Force concluded that there is no existing public or private entity with all of the necessary powers and expertise needed to carry the project forward. While a number of relevant models exist, a new and unique organization should be considered to manage the project.

A successful institutional arrangement would include four essential components:

1. Properly empowered public partners, which own the project and carry out essential government functions such as stewardship of public equity in the project resulting from grants of public funds and the ability to acquire real estate needed for the project.
2. Private partners, which capture the efficiencies and innovations available in the marketplace.
3. Project delivery mechanism, in the form of one or more properly procured contractual arrangements that will carefully delineate and allocate roles, responsibilities, risks and rewards, will protect the public interest and will capitalize on private sector entrepreneurial, technical and financial resources.
4. Private financial markets, which will purchase project revenue bonds and provide the majority of the funds needed to construct the project.

Four forms of project entities were considered, each of which has positive and negative characteristics associated with it.

First, a wholly private entity would have maximum flexibility in contracting and procurement, but would face skepticism from capital markets and would therefore have higher financing and insurance costs. It would be unable to acquire real estate from unwilling sellers, and would be challenged to address any unanticipated public perceptions concerning safety. It

would also be difficult provide adequate oversight of the expenditure of any public funds. An example of this type of entity is a commercial airline.

Second, an existing public entity would benefit from established expertise and administrative experience as well as experience with private capital markets. However, it would not offer focus on a single project and would face internal competition from other programs for funding and personnel. It would also need to expand its jurisdiction across state lines. An example of this type of entity is the Maryland Transportation Authority.

Third, a newly created single-jurisdiction entity would provide the ability to "tailor" legislation to fit needs of entity, could benefit from public powers of real estate acquisition and tort claims immunity, but would lack administrative experience, familiarity with capital markets and jurisdiction across state lines.

Fourth, a newly-created multi-jurisdiction entity would have the same benefits as a single-jurisdiction entity, would reduce the need for interstate contracts to address issues and should facilitate cooperation and support from participating jurisdictions. However, it has the same challenges as a single-jurisdiction entity and would take more time to create because identical legislation would have to be adopted in both Maryland and the District of Columbia. An example of this type of entity is the Washington Metropolitan Area Transit Authority (WMATA).

Finally, the Task Force was advised that without proper authority to acquire necessary real estate in a timely manner the project could not go forward. This authority would apply to the ability to acquire surface as well to sub-surface easements needed for tunneling. All real estate must be acquired before revenue bond financing can be initiated. The Task Force was presented with information on condemnation procedures as well as "quick-take" authority. Both have certain limitations and time disadvantages in Maryland. Sufficient authority could be granted through federal legislation (similar to that granted to WMATA under an interstate compact) and would not necessarily require a constitutional amendment.

Task Force Observations

Critical factors identified by the Task Force to consider when shaping such an entity include:

1. Financing: How best to access the credit markets and persuade financial sources of the credibility of the bond issuer?
2. Property Acquisition: How best to acquire necessary property in a timely manner?
3. Procurement: How to assure the entity is empowered to acquire the necessary technology, which may require sole-sourcing, and "best value" instead of "low-bid?"
4. Flexibility: How best to achieve flexibility in rate setting and management decision-making?
5. Expansion: How best to allow for expansion into other states in the future?

6. Competition: How best to demonstrate to the Federal government and the investment community the commitment of the State of Maryland to the project?
7. Dedicated Resources: How best to assure that resources and staff are dedicated to the primary mission of the entity?
8. Other Public Partners: How best to secure the cooperation, support and participation of the District of Columbia, and down the road, other states?
9. Maximizing Partnering Opportunities: How best to maximize the opportunities for partnering through joint ventures and other contractual arrangements?
10. Public Oversight: How best to assure the public that public funds are properly utilized and public policies are properly enforced and applied?
11. Appropriate oversight role for District and future participating states must be anticipated.

With regard to real estate acquisition, the Task Force concluded that because availability of needed real estate will be a major early concern to bondholders, the entity must have the power of eminent domain or the ability to use the State's power. Although the Task Force also observed that the entity would further benefit from an expedited real estate acquisition process such as "quick-take," not all members agreed this additional power is appropriate or, lacking strong public support for the project, would be supported by elected officials. In any case, the Task Force recommends the entity be first required to make a good faith effort to negotiate with property owners before eminent domain is considered.

With regard to oversight of a Maglev entity, the Task Force recommends the level and form of oversight be given serious consideration. Oversight must be provided to justify the public investment, assure rider confidence in the safety and security of the system, assure adherence to original mission and purpose and conduct business in a manner that is open to public review and scrutiny. The Task Force notes the need for balance of oversight between legislative bodies and bondholders.

The need to provide oversight, however, must be balanced with the risk of hampering the ability of the entity to respond promptly to market conditions, repay bondholders, act in a business-like fashion and retain a significant degree of independence from political pressure.

Types of oversight reviewed by the Task Force included: 1) governance by a board whose membership could be balanced among the participating jurisdictions; 2) approval from public agencies of the financing plan, development plan and fares and rate structures; 3) public hearings and specified stages of the development of the project; 4) audit authority over books and records; and 5) legislative power over future amendments and expansions.

State and federal legislation will be necessary to establish a new entity or to further empower an existing one such as WMATA. In either case, identical legislation must first be enacted in Maryland and the District of Columbia. Following that, federal legislation is necessary to ratify any interstate compact.

CHAPTER 4: PROCUREMENT CHALLENGES

Unique Project Characteristics

The Task Force concluded that at least two aspects of procurements are unique to this project:

1. Substantial project risks must be allocated to the party that can best manage them through a procurement regime that is tailored to the unique characteristics of the project. One possibility is through a "design-build-operate-maintain" (DBOM) procurement regime although the Task Force believes there are other models.
2. The Maglev technology is owned by a single corporate entity. MTA studies have revealed, and the Federal Railroad Administration has concurred, that there is no viable, ready-to-deploy alternative to Transrapid (TRI). Therefore, a unique contracting relationship is required to manage this relationship and achieve the federal intent of a technology transfer to the United States.

Procurement Issues Presented to Task Force

Of the various options for procurement, the Task Force was presented with information showing that DBOM appears to offer the greatest opportunity to manage project risks. For projects of this nature, several project responsibilities can be combined in a competitive procurement to achieve improved cost; schedule; and other risk control necessary to attract private financing.

DBOM is a form of contract in which a consortium of private firms, as a single point of responsibility, will undertake a broad scope of work, including completion of the design, management, construction of civil works, guideway, operating systems, stations and related facilities, technology supply, systems operation, and project maintenance. The DBOM consortium plays a vital role by providing the needed expertise in these areas of project development and operation.

Potential benefits of DBOM provided to the Task Force were as follows:

1. Combines design, construction, operations and maintenance of civil work and operating systems in one creditworthy entity or consortium;
2. Magnitude of project has the potential to attract highly creditworthy, experienced and expert teams;
3. Enables fixed price and guaranteed completion date (with narrow exceptions) because contractor has:
 - Enhanced control over cost and project management
 - Greater flexibility in design and scheduling

- Greater opportunity for innovation
- Incentives for creative solutions and work-arounds
- Streamlined project administration;
- 4. Controls cost growth and reduces inflationary effects;
- 5. Synchronizes design and development, which limits schedule slippage and shortens time to commencement of revenue operations;
- 6. Minimizes finger pointing, blame and excuses among various contractors regarding responsibility for design, construction, operational and maintenance problems;
- 7. Promotes life cycle cost efficiency; and
- 8. Enables performance-based specifications and long term performance assurances.

With regard to the technology provider, TRI was selected by the MTA as technology supplier because it is tested and meets federal Maglev Deployment Program requirements, is backed by corporate parents with substantial assets to back performance warranties, and states it is capable of providing fixed price and guaranteed completion times for Maglev system. The Task Force was further advised that while the DBOM contractor would assume much of the risk such as schedule, production, and management, the entity that selects the technology will also assume risk.

Task Force Observations

The Task Force recognizes that a sole source procurement may be appropriate for this project, but notes it could have long term risks due to lack of competitive pressure to reduce price. In addition, the Task Force notes that even in a DBOM type procurement, not all risks are assumed by the contractor. The entity selecting the technology (in this case, the State of Maryland) will assume some risk as well. The Task Force identified the following as key procurement issues yet to be addressed before any decision regarding procurement methodology is made:

Contracting Approaches

- What is the best design-build approach to manage project risks? For example, should design-build be contracted separately from operations and maintenance?
- Determine if there are major contractors able and willing to take on the size and scope of projected design-build responsibilities. If not, why? What are the alternatives?
- Define what stakeholders are best positioned to assume what risks?
- Determine how the risks of DBOM method, i.e., lack of competition, lack of track record, possible higher costs, would be mitigated.
- Determine which federal and State procurement requirements should be applicable, e.g., specified minimum participation by disadvantaged business enterprises.
- Determine that a surety of sufficient size is willing and able to support the project.

- Before proceeding, the Task Force recommends a study of a stabilization guarantee from the contract provider be conducted to indicate if that entity could be the first financial line of defense for any shortfall occurring during a specific period of time.

Risk of Single Technology Supplier

- Determine the best way to obtain pricing from TRI. Should the owner separately negotiate TRI pricing and responsibilities for inclusion in each DBOM team proposal? Or should DBOM proposers individually deal with TRI and make their deals prior to submitting proposals?
- Determine if the owner should require DBOM proposers to team only with pre-qualified beam fabricators. Or alternatively, should DBOM proposers be free to choose other beam fabricators with the attendant risk that they will not qualify?
- What are the project risks associated with failure of the sole source supplier to perform?
- Determine risk if supplier goes out of business or no longer serves Maglev operations.

Risk of Cost Overruns

- Define if the industry foresees a need for major exceptions to fixed price, guaranteed completion date requirements. If so, what?
- Decide if the partnering process planned between short-listing and RFP issuance is a valuable tool. How should that process be structured to maximum mutual benefit?
- Determine how sufficient is preliminary engineering in laying foundation for fixed price and completion date guarantees.
- Determine if the affordable surety bonds are available to cover, in whole or in part, performance and completion guarantees.

Once procurement related decisions are made, it is likely that legislation and regulatory changes may be necessary to permit certain exceptions for the Maglev project. Such legislation would need to be enacted as soon as possible to apply to early project decisions.

The Task Force also discussed minority business participation in the project. The Task Force agreed that the new entity's procurement practices should contain provisions for a minority business participation level with goals similar to the goals currently in statutes for Maryland and the District of Columbia.

CHAPTER 5: REVENUE, COSTS AND FINANCE PLAN CHALLENGES

Unique Project Characteristics

The Task Force concluded that the Maglev project presents unique challenges in its finance plan in at least three ways:

1. The project will require substantial financing from the private bond market, currently estimated to be \$2 billion of the \$4.4 billion cost.
2. The private capital market must therefore be convinced that project revenues will support necessary coverage and earn an investment grade rating.
3. Substantial commitments of Maryland, the District of Columbia and federal funding are necessary to secure bond market financing, and must be provided in advance of seeking to sell project bonds.

The various parts of the financial plan, while appearing independent, must all fall into place and succeed for the overall plan to succeed.

Finance Plan Presented to Task Force

Capital Cost Estimate

The capital cost estimate for the system is \$3.7 billion in current dollars, and \$4.4 billion when inflated to the mid-point of construction in 2008. Capital cost was determined using engineering data, and was updated during the project planning study to reflect changes made to the project alignment and elevation. Capital cost estimates were developed for each of the components based on unit price and quantity, the method of construction or fabrication, and the project schedule for delivery and the schedule for project integration and start up.

Prices for materials and labor are derived from standard construction references (RMS Means) and comprehensive construction cost data bases for projects having similar structures, and construction methods. For each of the line items, for example, a concrete pier or guideway span or tunnel, the costs are determined and a separate contingency of 10% to 30% was applied based on the current level of design, status of project, and level of confidence in the data required to set the design.

Because of lack of information about specific soil conditions, any element of the project located below the ground surface was assigned a contingency of 30%. Tunnels and foundations for the piers fall into this category. Slightly lower contingencies were applied to structures with known quantities and design characteristics.

Throughout the cost estimating procedure, every attempt was made to make conservative assumptions for the costs. For example, a steel guideway was assumed in the estimate despite possible cost savings from the concrete guideway for part or all of the alignment. The type of guideway and material from which it will be fabricated would be determined in the bidding process.

Table 1 indicates the total cost of each of the major project elements in 2002 dollars.

Table 1: Project Cost by Major Categories (millions of 2002 dollars)

Vehicles	\$245
Propulsion	\$487
Power Supply	\$47
Op/Control	\$102
Guideway	\$1,695
Stations & Maintenance Facilities	\$464
Existing Infrastructure Modifications & Right of Way *	\$187
Soft Costs**	\$479
Total	\$3,706

* Right of way costs are estimated to be \$100 million of this amount.

** Soft costs include engineering design, construction management, program management and training.

Operating and Maintenance Cost Estimate

In addition to capital costs, operating and maintenance (O&M) costs for the project were also estimated. Estimates were prepared from data supplied from Transrapid, Inc. based on its experience operating a prototype facility. A 30% contingency was applied to account for the lack of a system in revenue service in North America. Table 2 indicates O&M costs by major cost element for both three and four station systems. (Note: salaries reflect management category labor and wages reflect hourly labor costs.)

Table 2: Major Components of Operating and Maintenance Costs in 2010 (shown in 2002 dollars)

	3 Stations	4 Stations
Salaries	\$ 4,902,000	\$5,301,000
Wages	\$12,780,900	\$14,141,700
Non-personnel	\$20,779,700	\$25,413,100
Fixed Costs	\$ 1,897,900	\$1,897,900
Total Costs	\$40,360,400	\$46,753,800
30% Contingency	\$12,108,100	\$14,026,100
Total Costs	\$52,468,500	\$60,779,900

Ridership, Fare & Revenue Estimate

An estimate was prepared of Maglev ridership based on two fare structures, and revenues were projected based on that estimate. The ridership forecast was prepared using a rigorously conducted "stated preference" survey and a sophisticated travel demand model originally developed for the Channel Tunnel from England to France. Work has been overseen by a panel of nationally recognized experts, and a number of refinements have been undertaken as a result of their comments.

Key modeling process elements include the following steps:

1. Data and zone system development
2. Calibration and model inputs
3. Development of preliminary forecasts for ridership and revenues, including total market and market shares for auto, transit, and Maglev
4. Validation of the base forecast using trip flows, time comparisons between modes and airport access comparisons
5. Testing of alternative fare, service frequency, and station access strategies with the base scenario
6. Development of a revised forecast with agreed upon fare, frequency and station access strategies

Operating plan assumptions for the ridership forecast are as follows:

- Travel Times: Based on engineering operational analysis; 18 minute travel time from Baltimore to Washington; 142 trains/day
- Station Wait Times: 7 minutes in peak; 13 minutes in off peak
- Fares: two types tested:
 - (1) "Base" fare: set by policy to correspond with current Amtrak fares
 - Full Base Fare: \$0.60/mile (business/other)
 - Discounted Base Fare: \$0.30/mile (commuter)
 - (2) "Optimized" fare: increased above base fare until resulting decrease in ridership means net decrease in revenue
 - Full Base Fare: \$0.84/mile (business/other)
 - Discounted Base Fare: \$0.42/mile (commuter)

Table 3 provides fares assumed for all trips.

Table 3: Maglev Fare Structure

	Camden-BWI	BWI-Union	Camden-Union
Base Fare			
Full	\$10.00	\$20.00	\$24.00
Discounted	\$5.00	\$10.00	\$12.00
Optimized Fare			
Full	\$14.00	\$28.00	\$33.60
Discounted	\$7.00	\$14.00	\$16.80

To increase the likelihood that future project revenue bondholders would have confidence in the ridership forecast, a peer review group of nationally recognized experts in the field, supplemented by staff of the U.S. Department of Transportation's Volpe Transportation Systems Center, Baltimore Metropolitan Council, Washington Council of Governments and several investment banking representatives have observed the process and recommended adjustments and variations in the assumptions used, some of which are still being processed.

Results of ridership/revenue forecast are shown in Tables 4 and 5 and are subject to a +/- 15% error.

Table 4: Ridership Forecasts, Three Station Scenario

Year	Annual Ridership (millions)	Daily Ridership
2010	11.3	33,600
2020	14.2	42,200
2040	19.7	58,500

Table 5: Revenue and Operating Costs, Three Station Scenario
(millions of 2002 dollars)

Year	Base Fare		Optimized Fare	
	Revenues	O&M Costs	Revenues	O&M Costs
2010	175.2	52.5	220.0	52.5
2020	217.8	70.5	275.4	70.5
2030	258.4	94.8	329.2	94.8
2040	299.1	127.4	382.9	127.4

Several major conclusions may be made from the ridership forecast. First, the Maglev market share is approximately 7% of total trips made in the "catchment" area. Of the non-

Maglev trips; 87% are by car; and 6% are by other transit. Second, 83% of Maglev trips are diverted from cars; 12% are diverted from MARC; 1% are diverted from Amtrak; and 4% are "induced" and would not take place but for Maglev. Third, over time, Maglev demand matches growth of total travel demand in the region. Fourth, only 3.9% of commuter demand is met by Maglev. 85.4% of commuter demand is served by car and 10.7% is served by other transit. Finally, Maglev captures 14% of BWI passengers in 2010. The Finance Plan relies on base fare for the four station scenario and optimized fare for the three station scenario.

Finance Plan

The project finance plan is based on the conclusions reached above regarding capital costs, O&M costs, ridership and revenue. The finance plan shows a combination of funding sources, including project-supported revenue bonds and grants from the federal, Maryland and the District of Columbia governments. Based on the current estimates of ridership and revenue, \$2 billion could be raised from the sale of revenue bonds, approximately \$1.5 billion is expected in State and federal grants, and the remainder will come from the U.S. Department of Transportation's Transportation Infrastructure Finance and Innovation Act (TIFIA) Program which provides below treasury rate financing for large public infrastructure projects. As with other forecasted projections, all components must fall into place to be successful.

Table 5 shows the primary components of the finance plan.

Table 5: Estimated Sources of Funds (millions of 2008 dollars)

Project Revenue Bonds	\$2,000
Federal Grant	\$950
MD & DC Contribution	\$500
TIFIA	\$975
Total	\$4,425

Each of the components of the finance plan is addressed in turn below.

Project Revenue Bonds make up the largest single source of financing at approximately \$2 billion. This amount was derived from an analysis of project revenues, but will ultimately be determined as ridership and revenue forecast are refined. All or part of the project revenue bonds will be structured to obtain at least a minimum investment grade credit rating. Any debt issued was considered to be self-supporting, and does not require State or federal guarantees.

Key assumptions related to project revenue bonds are as follows:

- A corporate entity is created with necessary powers to issue debt, oversee the project and manage risks.
- Bonds are backed only by the future revenues of the project, and are not guaranteed in any way by any federal, State, or local governments.

- O&M costs are paid before debt service on bonds; funds available for bond repayment are net of costs.
- Bonds are able to receive investment-grade ratings due to availability of appropriate coverage levels, reserve funds requirements and legal protections. Coverage levels assumed are 1.5 on senior debt and 1.1 on TIFIA debt. There is a debt service reserve fund requirement of 10% on par values.
- Bond insurance can be obtained to reduce interest rate. Bond insurance is a one-time payment of 1.5 percent of the total.
- Surety bond can be used for the debt service reserve fund requirement.
- Bonds have a final maturity of 40 years.
- Interest rate assumed is the current market conditions plus one percent. With AAA bonds for 40 years plus one, this is 6.5%.

The second element of the project finance plan is a federal grant of \$950 million, the amount currently authorized in the Transportation Equity Act for the 21st Century (TEA-21). This authorization specifies that federal funds are limited to the lesser of \$950 million or two-thirds of the eligible capital costs. In this case, the project will warrant award of the entire \$950 million with other sources required to fund the remaining guideway costs, stations, vehicles and equipment.

TEA-21 will expire in September, 2003, and a new authorization will be passed by Congress. The provisions of the law that apply to a Maglev project may be re-drafted, and funds authorized may be equal to, less than or more than the current amount. If less than \$950 million in federal funds is ultimately available for this project, other funds will be required to fill this gap. Federal funds are treated as an equity contribution.

The third element of the finance plan is the contribution by the State of Maryland and the District of Columbia. Like the federal grant, such funds are treated as project equity and will not be re-paid with project revenue. (In the event that all debt was paid off, any excess revenues could be used to re-pay previous contributions.) It is likely that State funds would be used for early project costs like right-of-way acquisition that will come in advance of revenue-backed funding sources. The State contribution is not budgeted at this time. Current State (1/3) and federal (2/3) funding for the project is limited to \$15.6 million for planning, and has been largely expended already. With regard to Maryland's share of State funds, the Task Force believes that local governments in Maryland should not be required to make a financial contribution. In Maryland, prior to expenditure, sufficient State transportation revenues must be authorized by the General Assembly and subsequently appropriated through the Maryland Department of Transportation capital budget (CTP) as part of the State's capital budget process. This two-step action by the Legislature generally occurs over two legislative sessions. To adhere to the proposed schedule, funds would need to be authorized and appropriated no later than the 2004 legislative session for use in early 2005.

The final element of the finance plan is primarily financing from a federal program known as TIFIA that was established to provide loans and credit support for large infrastructure

projects. TIFIA makes treasury rate loans, but is able to subordinate to private bondholders and is able to be a "patient" lender, allowing repayment to be delayed for five years after the start of revenue service. To qualify for TIFIA funding, the State will need to submit an application for consideration.

Several issues and assumptions associated with the finance plan are worth noting. First, the plan is structured about the availability of the State and federal grants in the early years of the project, and that they be provided as equity investments with no expectations for repayment. Second, the timing of funding is critical. In order for the project revenue bonds to receive a reasonable rating, bondholders must understand when funds are available. Therefore, it would be critical for the State and federal funds to be firmly committed, although actual receipt of funds can come later than commitment of funds. Approximately \$100 million in early money would be required to acquire right of way because this is an early project component. Based on an assumed opening in 2010, State funds for right-of-way would be needed in 2005 although some actions to budget these funds would be required before that time. A possible project timeline is contained in Appendix 3.

Task Force Observations

Regarding the overall plan, several members of the task force expressed concern about the uncertainty of elements of the finance plan as well as the likelihood that each element would fall into place in the required sequence. It was also noted that while transit projects in the past have often been funded at 80% federal/20% state, this project requires a different split. This is largely due to the fact that over half of the project costs are being funded through revenue bonds. The Maryland and District of Columbia capital grant to the project is much less (under 15%) than traditional transit projects. Specific comments on the various plan elements are as follows.

Availability of Federal Grant

- The finance plan assumes a federal grant to the project of \$950 million, the amount currently authorized. The Task Force notes there is some risk associated with this assumption because the current authorization will expire in September 2003, and whether this funding will be available in the subsequent authorization will not be known until that time. For these funds to be available, the Congress will also be required to appropriate them in addition to the reauthorization.
- Other projects are also competing for federal funding. At this time at least two other projects are competing for federal Maglev funding – Pittsburgh and Las Vegas, and there are other high-speed rail projects in California and Florida. The funding needs of Amtrak are also not addressed.
- The Task Force believes that consideration should be given to seeking a larger federal contribution given the "demonstration" nature of the project, although the federal share is already approaching 50% if TIFIA funds are counted.

Availability of State Grant

- Current project funding is limited to \$15.6 million for planning contained in the CTP, most of which has been previously spent. The finance plan assumes a State grant (paid by the State of Maryland and the District of Columbia) to the project of \$500 million.
- No assumptions have been made about how the \$500 million could be divided between the State and the District of Columbia. Task Force members believe that local governments in Maryland should not be required to make financial contributions although local contributions would be accepted.
- The District of Columbia indicated to the Task Force that it was willing to negotiate a contribution to the project, but this would be dependent on its conclusions about the benefits relative to Maryland. In particular, it stated that a fourth station at New Carrollton would diminish these benefits to the point that the District would no longer participate financially.
- A commitment for such funds is needed before the financing plan, including the TIFIA funding application and the revenue bond ratings, can be pursued.
- The Task Force notes that in this time of fiscal constraints, there are other high cost transportation projects competing for State and federal funds. Highway and transit projects currently in the planning stages include the Intercounty Connector; the Purple Line; the Corridor Cities Transitway; segments of the Baltimore Regional Rail System Plan; and WMATA extensions and rehabilitation needs.
- Some members of the task force are concerned about the possible risk to state and federal funds should the interest rates assumed not hold true. At the time revenue bonds are sold, the state and federal funds will have already been committed and spent and due to any significant rise in interest rates, the financing plan will no longer work. The unfinished the project could not proceed. The Task Force recommends that care be taken to revise the finance plan to account for any such changes.

Operating Costs and Revenues

- If revenues were insufficient to support operation and maintenance costs and make payments to bondholders, the bonds would default and bondholders would take over the system. The Task Force noted a need for assurances that the burden of any shortfall in revenues would not be a liability of the State.
- The Task Force discussed how Maglev is unlike a conventional transit service that always requires an on-going subsidy. Typical Maryland transit operating subsidies range from 40% to 60% of total operating costs, and no portion of the capital cost is supported from revenue. The Maglev project follows a different economic model, and is more analogous to the passenger airline industry in which the fixed facilities are provided publicly but private companies run and pay for operations.
- The Task Force noted that operating and maintenance costs assumptions could be low at only 1 1/2% of the capital costs. Some members believe that other high-tech

projects have O&M costs at least at the 7% level. This issue should be more thoroughly investigated to assure correctness.

Capital Cost Estimate

- The Task Force noted the need for high contingencies in the cost estimate, particularly for tunnels where soil conditions are unknown. This is particularly important where conditions are unknown in areas where tunneling is required and for construction of foundations are needed.
- The Task Force asked that cost estimates reflect local prevailing wages, and was satisfied that they do pursuant to existing federal and Maryland law.
- Under the financing plan, the Task Force noted that the Maglev project Maryland/District of Columbia share of capital cost at 15% of the total project cost is far less than most other transportation projects.

Ridership Forecast

- The Task Force notes the peer review panel and study team has undergone four ridership panel meetings with an objective to evaluate the ridership model and develop methods to improve the assumptions used to generate the forecasts. Despite this, the Task Force remains concerned about the forecast and its implications for the finance plan. Further, it should be noted that final ridership revisions were not completed for the Task Force to review.
- The Task Force made note of the fares assumed in the ridership forecast, and expressed concern as to whether riders would be likely to pay significantly more than a MARC fare on a regular basis.

The Task Force made note of the high ridership assumed from the BWI Airport station, and was concerned that despite the significant growth in airport traffic between now and 2010, this ridership would not be realized. There is also a concern about the secondary impact of public and private revenue lost due to the reduced demand for taxi, limousine and rental cars. The Task Force is concerned about the assumptions being made about the availability of parking at the stations. While the initial model run assumed unlimited parking, results were later factored downward to reflect more realistic assumptions. At Union Station, all parking demand will be accommodated in adjacent existing and planned commercial parking facilities, with no dedicated parking for Maglev riders. At BWI, 500 spaces are assumed to be constructed below grade at the station and the remaining demand of 1,500 will be accommodated with the new additional off-site parking supply constructed by the Airport. At Camden Station, demand for 2,000 spaces will be accommodated by 500 spaces at the station and 1,500 spaces at the new parking facilities off-site constructed by the project. Locations for the needed off-site parking have not been secured. Without sufficient parking, ridership projections may not be met. While the cost of off-site parking construction is included in the project costs, the financial analysis does not yet include the O&M costs or parking revenue stream.

CHAPTER 6: OTHER SIGNIFICANT ISSUES

The Task Force discussed other unique issues that must be evaluated as the project is considered.

Analysis of Total Economic Benefits and Costs

Given the considerable public funds required for this project, and the fact that many of the benefits have not been quantified, the Task Force believes that before proceeding with the project that a rigorous economic benefit-cost analysis be conducted by a qualified economics firm with experience in such studies. This analysis should include reviewing the requirement that a stop at BWI is necessary for the project to be economically viable as some members felt that the airport stop may diminish the benefits to Baltimore. This analysis should be performed directly for the Office of the Secretary of Transportation to assure that the study is conducted so as to assure maximum credibility

Security

Security of a public transportation system includes both the common crimes (vandalism, theft, robbery, etc.), as well as more current concerns involving acts of terrorism. The project review is mid-way through an evaluation to identify the major security issues related to the Maglev system. Ultimately, when the system is fully designed and an authority or owner is in place, a detailed security plan will be developed that includes the procedures and processes to protect the public to the maximum extent possible.

Basic security issues identified by in the MTA study include:

- The Maglev ownership entity and its responsibilities and role.
- Employment practices: profiles, training, communication, responsibility outline.
- Jurisdictional coordination, control and transfer, particularly in the stations and intermodal facilities such as Union Station currently has more than four authorities involved in public safety, depending on the nature of the incident, whether fire, shooting or other.
- Technology and operations:
 - Robust guideway
 - Vehicle location and guideway integrity sensing capabilities
 - Auxiliary and emergency stopping procedures
 - Evacuation procedures
 - Redundancies

The Task Force concluded that there is a lack of relevant model for security, and urged that careful consideration be given to this aspect of planning the project.

Liabilities and Warranties

The Task Force received information regarding Liabilities and Warranties and the need to protect private sector participants from excess liability. That information summarizing those points as well as options for risk management may be found in Appendix 3.

Need for Additional/Continuing Public Input

Despite the level of public input previously received, the Task Force remains concerned that additional opportunities for input be provided, particularly in Prince George's County where the Task Force believes the communities most impacted by the project have not had a sufficient opportunity to comment. The Task Force recommends that the MTA schedule additional public information meetings for the communities along the proposed alignment in Prince George's County as soon as possible.

Appendix 1

House Bill 1430

**Task Force to Evaluate the Development and Construction
Of a Magnetic Levitation Transportation System**

Appendix 1

HOUSE BILL 1431

2002 Regular Session
(2lr2995)

ENROLLED BILL

— Commerce and Government Matters/Finance —

Introduced by Delegates McIntosh, Sophocleus, Love, Cadden, and Rosso

Read and Examined by Proofreaders.

Proofreader

Proofreader

Sealed with the Great Seal and presented to the Governor, for his approval this
____ day of _____ at _____ o'clock, ____ M.

Speaker

CHAPTER 573 _____

1 AN ACT concerning

2 Task Force to Evaluate the Development and Construction of a Magnetic
3 Levitation Transportation System

4 FOR the purpose of establishing a Task Force to Evaluate the Development and
5 Construction of a Magnetic Levitation Transportation System, specifying the
6 membership and duties of the Task Force, providing for the appointment of
7 chairpersons of the Task Force, providing for staffing of the Task Force,
8 prohibiting a member of the Task Force from receiving certain compensation,
9 authorizing a member of the Task Force to receive reimbursement for certain
10 expenses, requiring the Task Force to report to the Governor and the General
11 Assembly on or before a certain date, providing for the termination of this Act,
12 and generally relating to the establishment of a Task Force to Evaluate the
13 Development and Construction of a Magnetic Levitation Transportation System.

1

Preamble

2 WHEREAS, The eastern seaboard of the United States constitutes the most
3 highly developed and integrated region of the United States, which requires an
4 effective and efficient transportation system in order to maintain and enhance its
5 economic well-being; and

6 WHEREAS, The existing modes and methods of transporting people and goods
7 are near or at capacity, suggesting the need for innovative new technology as a means
8 of continuing and maintaining growth, development, and job creation within the
9 region; and

10 WHEREAS, The Congress of the United States has enacted Public Law No.
11 105-178, the Transportation Equity Act for the 21st Century, which authorizes the
12 funding, in part, for deployment of a Magnetic Levitation Transportation System
13 (Maglev) as an alternative; and

14 WHEREAS, The Federal Railroad Administration has approved the continued
15 evaluation of a demonstration project for Maglev between the metropolitan areas of
16 Baltimore and Washington; and

17 WHEREAS, A Task Force formed to evaluate the development and construction
18 of a prototype Maglev system would make possible an intensive review of innovative
19 ownership structures and potential public/private financing sources for the
20 construction, ownership, and operation of the prototype Maglev system; now,
21 therefore,

22 SECTION 1. BE IT ENACTED BY THE GENERAL ASSEMBLY OF
23 MARYLAND, That:

24 (a) There is a Task Force to Evaluate the Development and Construction of a
25 Magnetic Levitation Transportation System (Maglev) in Maryland between Baltimore
26 and the District of Columbia.

27 (b) The Task Force shall consist of the following members:

28 (1) three members of the Senate of Maryland; who represent legislative
29 districts containing the residential communities that will be the most significantly
30 impacted by the Maglev, appointed by the President of the Senate;

31 (2) three members of the Maryland House of Delegates who represent
32 legislative districts containing the residential communities that will be the most
33 significantly impacted by the Maglev, appointed by the Speaker of the House;

3 (3) the Secretary of Transportation, or the Secretary's designee;

4 (4) the Secretary of Business and Economic Development, or the
5 Secretary's designee;

6 (5) the Secretary of Budget and Management, or the Secretary's

8 (6) the Secretary of the Department of Planning, or the Secretary's
9 designee;

10 (7) one member of local government, appointed by the Mayor of Baltimore
11 City;

12 (8) five members of local government, appointed by the county executive
13 in each of the following counties as follows:

14 (i) one member from Anne Arundel County;

15 (ii) one member from Baltimore County;

16 (iii) one member from Howard County;

17 (iv) one member from Montgomery County; and

18 (v) one member from Prince George's County;

19 (9) five members appointed jointly by the President of the Senate
20 and the Speaker of the House to represent each of the following areas of expertise:

21 (i) engineering and construction;

22 (ii) banking and financing;

23 (iii) technology manufacturing;

24 (iv) transportation; and

25 (v) business development; and

26 (10) six members who represent the residential communities that
27 will be the most significantly impacted by the Maglev, appointed by the Governor as
28 follows:

29 (i) one member from Anne Arundel County;

30 (ii) one member from Baltimore City;

1 (iii) one member from Baltimore County;

2 (iv) one member from Howard County;

3 (v) one member from Montgomery County; and

4 (vi) one member from Prince George's County.

5 (c) The President of the Senate and the Speaker of the House shall jointly
6 designate 2 of the members as co-chairs of the Task Force.

7 (d) The Task Force shall:

8 (1) examine various alternative funding mechanisms as well as the
9 feasibility and benefits of and alternatives for establishing a State or
10 multijurisdictional authority, including as a partner the District of Columbia, to
11 implement the Maglev system. In this regard, the Task Force shall obtain input from
12 appropriate representatives of the District of Columbia and shall consider potential
13 State and local funding that may be required by the authority to implement the
14 project, taking into consideration the funding requirements of other transportation
15 projects,

16 (2) examine various alternative structures and public/private
17 partnership potential for the design, construction, ownership, and operation of the
18 Maglev system and for obtaining the financing required for these purposes,

19 (3) consider how to achieve the objectives of federal law regarding
20 implementing a public/private partnership within the context of a State or
21 multijurisdictional authority;

22 (4) evaluate the need for modifications to the procurement system to
23 respond to the needs of a Maglev system,

24 (5) develop recommendations regarding the establishment of a State or
25 multijurisdictional authority and the role to be played by the State and its various
26 agencies, and

27 (6) report its recommendations to the Governor and, in accordance with
28 § 2-1246 of the State Government Article, to the General Assembly on or before
29 December 1, 2002

30 (e) The Department of Transportation shall provide staff support for the Task
31 Force

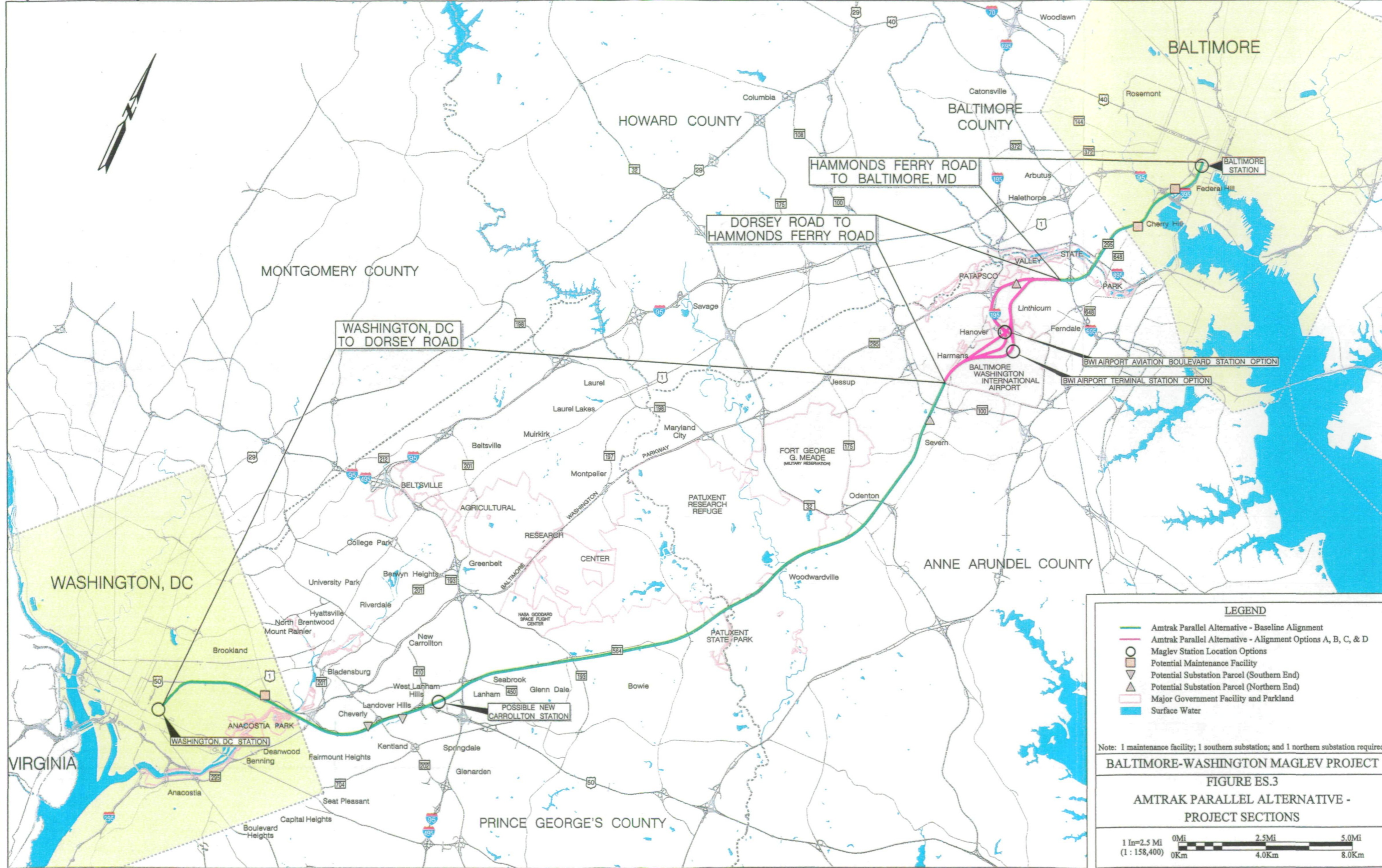
32 (f) A member of the Task Force

33 (1) may not receive compensation, but

34 (2) is entitled to reimbursement for expenses under the Standard State
35 Travel Regulations, as provided in the State budget

1 SECTION 2 AND BE IT FURTHER ENACTED, That this Act shall take effect
2 July 1, 2002 It shall remain effective for a period of 1 year and, at the end of June 30,
3 2003, with no further action required by the General Assembly, this Act shall be
4 abrogated and of no further force and effect

Appendix 2
Proposed Maglev Alignment Map



Appendix 3

Potential Maglev Project Timeline

Appendix 3

POTENTIAL MAGLEV PROJECT TIMELINE

October, 1998	TEA-21 enacted; establishes Maglev Deployment Program
February, 1999	Application submitted to Federal Railroad Administration (FRA) for Baltimore-Washington project
May, 1999	Seven projects selected nationwide, including Baltimore-Washington
February, 2000	Environmental Assessment submitted to FRA
June, 2000	Project Description submitted to FRA
January, 2001	FRA selects Baltimore-Washington and Pittsburgh projects for continued study
Fall, 2001	Public-Private Partnership Roundtable held in Baltimore
July, 2001	MTA initiates Draft EIS and Preliminary Engineering work
March, 2002	MTA holds public workshops on three alternative alignments
Spring, 2002	General Assembly adopts legislation to establish Task Force to recommend entity to develop, own and operate project
October, 2002 – January, 2003	Task Force meets; makes recommendations to Governor, General Assembly
February, 2003	Draft EIS completed; submitted to FRA
Winter, 2003	FRA holds hearing on DEIS; single “preferred” alternative selected
Spring, 2003	Final EIS and Preliminary Engineering work completed; final hearing held
May, 2003	Record of Decision (ROD) issued. Planning and environmental process completed.
2003	FRA selects single project
September, 2003	State funds for project placed in Draft FY 2004-2009 Consolidated Transportation Program
October, 2003	TEA-21 Reauthorization (project must be authorized to continue to receive federal funds)
Spring, 2004	In Maryland and District of Columbia, legislation enacted to establish entity to develop, own and operate project. In Maryland, State budget approved including project funding.
July, 2004	Maglev ownership entity created.
Fall, 2004	Congress ratifies interstate compact.
December, 2004	Project submitted to Baltimore and Washington Metropolitan Planning Organizations for inclusion in the Long Range Plan and Transportation Improvement Programs in both regions.
Summer, 2005	Following public input and review for air quality conformity, MPO’s approve project funding.
July, 2005	State appropriations begin.
2005	Project revenue bonds secured

2005-2006	Procurement of a Design/Build team. Design preparation and right-of-way acquisition.
2006-2009	Construction of guideway, facilities and stations
2009-2010	Safety testing and certification
2010	Revenue service begins

Note: all future dates assume preceding steps completed on schedule, funding is available and federal approvals are received.

Appendix 4

Members of Ridership Peer Review Committee

Appendix 4

MAGLEV RIDERSHIP ANALYSIS: PEER REVIEW PANEL BIOGRAPHIES

Daniel Brand, Charles River Associates (CRA), Intercity Demand Forecasting

Daniel Brand, CRA Vice President, is a former Chairman and current member of the Transportation Research Board (National Academy of Sciences) Committees on Passenger Travel Demand Forecasting, New Transportation Systems and Technology, and Intelligent Transportation Systems (ITS). In addition, he is the signatory officer at CRA for the New York Metropolitan Transportation Authority's more than \$6 billion in farebox revenue-backed bond issuances. He is the senior author of "Application of Benefit-Cost Analysis to the Proposed California High-Speed Rail System" (*Transportation Research Record*, forthcoming, 2001) and "Forecasting High-Speed Rail Ridership" (*Transportation Research Record* 1314, 1992), and has been a member of TRB's Intercity Rail Passenger Systems Committee. He was also a member of three National Research Council committees (High-Speed Surface Transportation, Small Aircraft Transportation Systems, and Advanced Vehicle and Highway Technology), and edited or co-edited the books *Urban Transportation Innovation* and *Urban Travel Demand Forecasting*. He is the author of numerous papers on transportation technology and planning, including "Theory and Method in Land Use and Travel Forecasting," which received the Best Paper Award in Planning and Administration at a TRB annual meeting. He also has made many presentations at High-speed Rail/Maglev Association and other professional meetings.

Mr. Brand's expertise is in transportation planning, finance, demand forecasting, pricing policies, and new transportation systems. Before joining CRA in 1977, he was Undersecretary of Transportation for the State of Massachusetts, Associate Professor at Harvard University, and Senior Lecturer at MIT. He is directing or has directed CRA's ridership and passenger revenue forecasts prepared for the following:

- Four congressionally mandated assessments of Amtrak's 1998–2005 passenger revenue forecasts of high-speed rail (HSR) in the U.S. Northeast Corridor.
- The proposed statewide HSGT system in California connecting San Diego, Los Angeles, the Central Valley, San Francisco, and Sacramento.
- The *US National Maglev Initiative* forecasts for 16 high-speed ground transportation corridors.
- An HSR line connecting Beijing and Shanghai, for the World Bank and the Ministry of Railways of China.
- The independent study of HSR ridership and revenue on the Texas TGV, as well as the earlier study of ridership on the Texas FasTrac system, connecting Dallas/Fort Worth, Houston, Austin, and San Antonio.
- A proposed high-speed maglev system connecting Las Vegas NV and Los Angeles.
- The Florida HSR system connecting Miami, Orlando, and Tampa.
- The proposed HSR line connecting all major cities in Taiwan.

- The joint federal and provincial study of high-speed ground transportation in the Canadian corridor (Québec City, Montréal, Ottawa, Toronto, Windsor).
- A new HSR line connecting Hong Kong and Guangzhou (Canton) China for the Kowloon-Canton Railroad Corporation (KCRC) in Hong Kong.
- HSR and maglev service between New York City, Albany, and Buffalo.
- HSR service between Boston and New York (four separate studies).
- Two studies of a high-speed peplemover system linking New York's La Guardia and JFK Airports with Manhattan.
- A maglev peplemover system in Las Vegas connecting the Airport, the Strip, and downtown Las Vegas.

Kazem Oryani, URS Greiner, Demand Forecasting

Dr. Kazem Oryani has over 24 years experience in transportation modeling. He currently serves as the Director of Transportation Modeling for Demand forecasting and has extensive experience in large-scale travel demand analysis, toll road modeling and transportation/land-use modeling.

His education credentials include:

University of Pennsylvania, PhD, City and Regional Planning, 1987;
MS, City Planning, 1978; BS, Economics, 1973

Dr. Oryani has been the recipient have many awards for his work including:

1997-1998 Engineering Achievement Award by Florida's Turnpike for the accuracy of traffic and revenue projections for Southern Connector Extension in Orlando.

1996 URS Overall National Technical Excellence Award for Florida's Turnpike Tampa Bay Regional Travel Simulation Model

1996 URS Technical Excellence Award--First Place, Surface Transportation for Florida's Turnpike Tampa Bay Regional Travel Simulation Model

1979 Full Scholarship Award for Ph.D. Studies for graduating first in MCP Graduate School

Dr. Oryani has recently participated in a number of significant transportation projects:

Seattle Popular Plan Monorail Ridership and Revenue Forecasts, Seattle, Washington: Project Manager/Modeling Expert for ridership and revenue forecasts for a proposed monorail transit system serving Seattle.

LIRR Eastside Access Model Review, New York, NY: Project Manager and modeling expert for the review of transit ridership forecasts for the Eastside Access Study. The project brings the Long Island Rail Road to Grand Central station on the eastside of Manhattan. The review

involved making independent computer model runs to replicate the consultant model results. This method served to examine the model procedures, sequencing and assumptions. Also, the study investigated to see if there were any potential problems with the forecasting methodology.

Forecast of the Ridership for the Proposed Upgrading and Extension of the Las Vegas Monorail System, Las Vegas, NV: Modeling expert for quality assurance, quality control for the forecast of the ridership for the proposed upgrading and extension of the Las Vegas Monorail System.

Ray Tillman, URS Greiner, Demand Forecasting

Mr. Tillman is a certified Professional Engineer in New York, Florida, Delaware, Massachusetts with over 40 years experience. He has been the **Principal-in-Charge/Project Manager** for numerous transportation planning, analysis and design projects. Experience includes traffic and revenue studies for public and private toll roads, feasibility and market assessments, traffic analyses, the development of Transportation System Management (TSM) systems, environmental assessments, preliminary engineering design and cost estimates. His work has encompassed all types of transportation facilities including highways, bridges, tunnels and automated guideway systems, as well as port and ferry facilities, airports and studies associated with new stadiums, convention centers and office buildings.

Mr. Tillman education experience includes BCE, Civil Engineering, from Cooper Union in 1957 and an MBA, Banking and Finance, Management, from New York University in 1964. He is a member of the American Road and Transportation Builders Association, President of the Public-Private Ventures Division, Fellow of the Institute of Transportation Engineers, and member of the American Society of Civil Engineers.

He is widely published on various aspects of transportation projects. Some of his work includes:

Tillman, R. and Feldman, R. "Shadow Tolls Are Coming," Public Works Financing, December 1995.

Tillman, R. et al, "Pitfalls Along the Public/Private Ventures Highway," Transportation Builder, November 1995.

Tillman, R. "Truck Fleet Operators Key to Toll Road Success," Public Works Financing, June 1993.

Tillman, R. "Public-Private Partnership Projects Allocate Costs and Benefits Fairly," Public Works Financing, June 1991.

Tillman, R. Editor, Public/Private Partnerships in Transportation: The State of the Art, American Road and Transportation Builders Association, May 1991.

Tillman, R. "The Role of the Project Manager," ITE Journal, June 1982.

Eric Miller, University of Toronto, Professor of Demand Forecasting

Eric Miller has Bachelor's and Master's degrees from the University of Toronto and a Ph.D. from M.I.T. He has been a faculty member in the Department of Civil Engineering, University of Toronto since 1983, where he is currently Bahen-Tanenbaum Professor and Director of the University of Toronto Joint Program in Transportation.

He served as Acting Chair of the Department of Civil Engineering during the academic year 1998-99. He is a past-chair of the Transportation Planning Committee, Transportation Association of Canada, and is currently co-chair of the U.S. Transportation Research Board's (TRB) Sub-Committee on Integrated Transportation – Land Use Modeling and a member of the TRB Passenger Travel Demand Forecasting Committee. He is the chair of travel demand modeling peer review panels for magnetic levitation demonstration projects in Pittsburgh and Baltimore.

His research interests include integrated land use-transportation modeling; analysis of the relationship between urban form and travel behavior; modeling transportation system energy use and emissions; and micro-simulation modeling. He has been the Principal Investigator in two recent projects dealing with integrated urban models: "Integrated Urban Models for Simulation of Transit and Land-Use Policies" (Transit Cooperative Research Project H-12, funded by the U.S. Transportation Research Board), and "Integrated Transport and Land-Use Modeling for Environmental Analysis" (funded by the NSERC), as well as co-investigator in a current SSHRC Major Collaborative Research Initiative, "Access to Activities and Services in Urban Canada: Behavioral Processes That Condition Equity and Sustainability." He is the developer of *GTAModel*, a "best practice" regional travel demand modeling system used by the City of Toronto, the Ontario Ministry of Transportation and several other groups to do travel demand modeling in the Greater Toronto Area.

Dr. Miller is a member of the International Association for Travel Behavior Research (IATBR), and has been on the Scientific Committee for the last four international conferences sponsored by IATBR. He is co-author of the textbook *Urban Transportation Planning: A Decision-Oriented Approach*, the second edition of which was published in 2001.

Appendix 5

Additional Comments from Task Force Members

James C. Rosapepe

8403 Patuxent Avenue, College Park, MD 20740
(202) 662-3744 jcrosapepe@yahoo.com

February 14, 2003

Mr. William S. Ratchford Mr. Thomas B. Deen
Task Force to Evaluate the Development and Construction of MAGLEV System

Dear Co- Chairmen Deen and Ratchford:

I appreciate the opportunity to provide comments on the Task Force report. Overall, the report is a substantive effort to meet the General Assembly's request for information on major issues raised by the MAGLEV proposal.

As you will recall, at a number of Task Force meetings, I and others suggested that we should consider the concerns raised by residents of communities through which the train is proposed to run. The report mentions them and endorses the request we made for more consultation with communities in Prince George's. Nonetheless, I believe the report does not make clear the significance of community impacts .

Based on the testimony and the comments of the elected officials who represent the affected communities, I concluded that community concerns, not institutional, legal, or financial issues, are the key questions the General Assembly will need to address as it evaluates this project. The overwhelming majority of the non-community issues are not unique. We have long had multi-jurisdictional transportation agencies, primarily bond supported projects, and major public works that required tailored legal structures.

All major transportation projects raise concerns in nearby communities. This one certainly does. Among them are noise, safety, and visual disruption – all real issues. MAGLEV is of greater than average concern because 1) it's new technology, so predictions of its impact are greeted with above average skepticism; and 2) since the ridership is expected to largely be BWI customers, most residents of Prince George's and Anne Arundel see themselves paying the costs and getting few benefits.

These are fair points – and much more important than the technical ones. I urge the General Assembly to take them seriously as it considers the MAGLEV proposal.

Best wishes,



James C. Rosapepe

CC: Missy Cassidy, MDOT